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APPLICATION NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
08/781,920	12/30/96	FUKUNAGA	0755-1614

IMS1/0526  
SIXBY FRIEDMAN LEBRON AND FRANKSON  
SUITE 600  
2010 CORPORATE RIDGE  
MCLEAN VA 22102

EXAMINER
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PAUSEY, M

ART UNIT	PAPER NUMBER
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1762

23

DATE MAILED: 05/26/98

This is a communication from the examiner in charge of your application.  
COMMISSIONER OF PATENTS AND TRADEMARKS

### OFFICE ACTION SUMMARY

☒ Responsive to communication(s) filed on 3/30/98

☒ This action is FINAL.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 D.C. 11; 453 O.G. 218.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

#### Disposition of Claims

- ☒ Claim(s) 24-55 is/are pending in the application.  
Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
☐ Claim(s) \_\_\_\_\_ is/are allowed.  
☒ Claim(s) 24-55 is/are rejected.  
☐ Claim(s) \_\_\_\_\_ is/are objected to.  
☐ Claim(s) \_\_\_\_\_ are subject to restriction or election requirement.

#### Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.  
☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.  
☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.  
☐ The specification is objected to by the Examiner.  
☐ The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. § 119

- ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).  
☐ All ☐ Some\* ☐ None of the CERTIFIED copies of the priority documents have been  
☐ received.  
☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_  
☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

- ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e).

#### Attachment(s)

- ☐ Notice of Reference Cited, PTO-892  
☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 22, 20, 21  
☐ Interview Summary, PTO-413  
☐ Notice of Draftsperson's Patent Drawing Review, PTO-948  
☐ Notice of Informal Patent Application, PTO-152

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(1) Claims 24-55 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In the preambles of the new independent claims "the steps" still lacks proper antecedent basis for reasons as previously stated, ie it is a newly introduced and not immutable term, so "the" should be deleted. This is of more than trivial importance since applicants refer to particular steps in following steps, and the words "the" and "said" are considered interchangeable, and what steps are claimed are not inherent.

In claim 24, line 14 "the range" lacks proper antecedent basis. Also see claims 32, 41 and 50. There is nothing inherent in the range particularly claimed.

In claim 32 "...film is not added with said solution" is non-idiomatic English phraseology, which appears to be intended to define the requirements of "selectively adding...". Similarly "a lateral direction with said insulating surface" uses phraseology which is not idiomatic. Would changing "with" to --with respect to-- provide applicant's intended meaning? See similar problems in claim 41.

What applicants intend in claims 31, 40, 49 and 55 by "said light fuses a surface...." is unclear to the examiner, since fusing often produces amorphous surfaces or joins two separate surfaces together, the former of which contradicts the independent claims and the latter has no clear outcome for the given situation. The discussion cited in the paragraph *bridgens p. 14-15* is unclear as to whether it is a negative or a positive teaching.

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In claims 38 and 47, the claim of "catalyst material at a first concentration of  $1 \times 10^{16}$  to  $1 \times 10^{19}$  cm<sup>-3</sup> is vague and indefinite as the <sup>units</sup> limits are incomplete. How is one measuring the material? By moles or atoms or grams, etc.? Without proper <sup>units</sup> limits this claim is almost meaningless. It is noted that the support cited on p. 21 indicates that "atoms" is appropriate.

In claim 41 "forming a channel forming region" appears to have some semantics problems. Also, a channel for what? Does the difference in composition inherently produce whatever effect is intended or do some unspecified steps need to be taken, such as doping with tradition semiconductor dopants?

(2) The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The non-statutory double patenting rejection, whether of the obviousness-type or non-obviousness-type, is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent. *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); and *In re Goodman*, 29 USPQ2d 2010 (Fed. Cir. 1993).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(b) and © may be used to overcome an actual or provisional rejection based on a non-statutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.78(d).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

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(3) Claims 24-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohtani et al (5,543,352) in view of Zhang et al (5,529,937) or visa versa, optionally in view of Liu et al (826) or Zhang et al (291).

Claims 24-55 are rejected under the judicially created doctrine of double patenting over claims 1-20 of U. S. Patent No. 5,543,352 <sup>to Ohtani et al, in view of</sup> ~~since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.~~

~~The subject matter claimed in the instant application is fully disclosed in the patent and is covered by the patent since the patent and the application are claiming common subject matter, as follows: Zhang et al (937) optionally in view of Liu et al (826) or Zhang et al (291)~~

~~Furthermore, there is no apparent reason why applicant was prevented from presenting claims corresponding to those of the instant application during prosecution of the application which matured into a patent. In re Schneller, 397 F.2d 350, 158 USPQ 210 (CCPA 1968). See also MPEP § 804.~~

Ohtani et al claims, hence teaches all aspects of applicant's claims, except the second thermal heating step, the formation of a transistor with channels, and the claimed fusing step whose meaning is not particularly clear, but may be considered covered by teachings of light or laser light used in the same fashion. The patent to Zhang et al teaches and claims a very similar process, with many overlapping steps, however it also teaches heating of the silicon film before, during and possibly after the irradiation step. Particularly see claim 56, or page 15, lines 18-51 and Figure 5, where 3 periods of heating are discussed in relationship to the light irradiation step,

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such that the third step with 200-500°C corresponds to applicants claimed second heating, with overlapping temperature ranges. Note that the present inventions claimed second heating can be either during or after the irradiation, as the irradiation step as described by the specification causes heat related effects, not photo reactions. Zhang et al (937)'s claims, such as 12, appear to be after or possibly during the irradiation, but have unclear temporal language. It would have been obvious to one of ordinary skill in the art to apply such heating in the Ohtani et al reference due to the similarities of the processes and the taught benefit of reducing defects and dangling bonds. Zhang et al particularly teaches the use of H<sub>2</sub> ambient instead of N<sub>2</sub> as claimed by applicants present claims 25, 33, 42 and 51, however inert atmospheres would also have been expected to be effective as they are conventionally used for annealing procedures, hence would have been expected to have been effective. Alternately Zhang et al (291) or Liu et al (826) teaches the use of Ar or other inert atmospheres for Ni or Pd- catalyzed annealing procedures of ~~α~~-Si films at temperatures within the presently claimed range although slightly higher than Zhang et al (937) third temperatures (col. 4, lines 20-48 and Ex. 2). Lui et al thus provides cumulative evidence that inert atmospheres, hence N<sub>2</sub>, would have been expected to be effective for the annealing of Ohtani et al in view of Zhang et al (937), where the particular temperature would have been optimized <sup>for</sup> of the atmosphere used by routine experimentation, with guidance from the temperature teachings of Zhang et al (937) and Lui et al.

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Zhang et al (937) also teaches use of their products, as claimed, for producing channel forming areas in transistor devices (col. 15, lines 52-59), hence use of the analogous Ohtani et al product for such would have been obvious.

Claims 25, 33, 42 and 57 differ by requiring their atmosphere to be N<sub>2</sub>, however Zhang et al (291) shows that for annealing semiconductors using heat, that N<sub>2</sub> is known to be an inactive atmosphere, hence obvious in view of the annealing procedures of the primary references which are also a heat treating  $\alpha$ -Si to cause crystallization. In Zhang et al (291) see abstract and claims, especially 1-10.

In Zhang et al (937) for further relevant teaching see abstract; Fig. 1 (etc); col. 4, lines 1-32 and 59-col. 5, line 20 and 58-col. 6, line 52, noting both thermal and radiation treatment appear to be taught to convert the amorphous area entirely to crystalline with col. 5 lines 5-10, discussing heating to 600°C in conjunction with using laser light. Particularly see col. 9, lines 15-45 for  $\alpha$ -Si with Ni to promote crystallization where first heating at 550°C in N<sub>2</sub> or Ar for 4 hrs is taught, than lines 46-59 where laser light is taught to “further promote” crystallization, which is consistent with applicant’s claimed limitations. Lines 55-59 discuss the effect on dangling bonds and reduction of defects. Col. 9, lines 60-67 give the next step which includes heating of the entire substrate from 300°-550°C, hence will also inherently fulfill the claimed thermal annealing which can also be a posttreatment step. Furthermore, in the making of device, after ion implanting (col. 10, lines 20-41), laser annealing is preformed again (col. 10, lines 42-67) and then it is taught that “it is important that dangling bonds caused in the process of light annealing... are

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neutralized by heating them at a temperature of from 250° to 400°C in the atmosphere of hydrogen in a later process” (col. 11, lines 12-16), hence cumulatively showing this concept. Note that Zhang’s process involves patterns after the annealing, which is consistent with the concepts of new claims 41 and its dependents.

(4) Applicant's arguments with respect to claims 24-55 are have been considered but are moot in view of the new ground(s) of rejection.

(5) Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire **THREE MONTHS** from the date of this action. In the event a first response is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than **SIX MONTHS** from the date of this final action.

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(6) Any inquiry concerning this communication should be directed to M. L. Padgett at telephone number (703) 308-2336 and Afterfinal Fax # (703) 305-3599.

M. L. Padgett/vr

05-14-98



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